

Claims

1. A riveting unit (1) with a holding-down means (3) and a riveting die (4), it being possible for the holding-down means (3) and the riveting die (4) to be driven hydraulically by means of a holding-down piston (12) and of a die piston (13), characterized in that the holding-down piston (12) and the die piston (13) are activated by the same hydraulic pressure, the effective piston area (36) of the holding-down piston (12) being formed to be smaller than the effective piston area (14) of the die piston (13).
2. The riveting unit as claimed in claim 1 or in particular as claimed therein, characterized in that the holding-down piston (12) is disposed within the die piston (13), which is formed as an annular piston, and the holding-down piston (12) is coupled to the holding-down piston (3) by engaging radially through the die piston (13).
3. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the holding-down piston (12) and the die piston (13) are each biased in their starting position by means of a spring (19, 28), the spring (19) of the die piston (13) being set to a stronger setting than the spring (28) of the holding-down piston (12).
4. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the springs (19, 28) are disposed concentrically in relation to one another.
5. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the die piston (13) forms a central cylinder (23) in which the holding-down piston (12) is disposed.

10069838-052002

6. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the restoring spring (28) of the holding-down piston (12) is supported against a pressure-exerting disk (32), which is disposed in the inlet region of the cylinder (23) and leaves a through-passage (31).
7. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the holding-down means (3) and the riveting die (4) are formed, over part of their length, as sleeve bodies (33, 21) which are disposed concentrically in relation to one another and can be displaced axially in relation to one another.
8. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the cylinder (21) in which the holding-down piston (12) is guided has a hydraulic volume (58) which is shut off in the outward direction by means of valves (56, 57).
9. The riveting unit as claimed in one or more of the preceding claims or in particular as claimed therein, characterized in that the valves (56, 57) are used to set a holding-down force (H) which is uniform until the riveting operation is carried out.
10. A riveting unit (1) with a holding-down means (3) and a riveting die (4), in which there is a feed of rivets (38) which are combined in a rivet chain (39), characterized by an advancement pawl (46) which runs over a rivet (38) during a rearward movement and moves the rivet (38) forward during an advancement movement, the rearward movement, furthermore, being derived from the movement of the riveting die (4).

10069838.052002

11. The riveting unit as claimed in claim 10 or in particular as claimed therein, characterized in that the riveting die (4) displaced back for a riveting operation is not moved fully out of the movement path of the tip (47) of the advancement pawl (46), said pawl advancing the rivet (38).
12. The riveting unit as claimed in one or more of claims 10 to 11 or in particular as claimed therein, characterized in that the advancement movement of the advancement pawl (46) is stop-limited by striking against the riveting die (4).
13. The riveting unit as claimed in one or more of claims 10 to 12 or in particular as claimed therein, characterized in that the advancement pawl (46) is spring-biased in the advancement direction.
14. The riveting unit as claimed in one or more of claims 10 to 13 or in particular as claimed therein, characterized in that the advancement pawl (46) during advancement, interacts in each case with the rivet (38) which is next to be processed.
15. The riveting unit as claimed in one or more of claims 10 to 14 or in particular as claimed therein, characterized in that the advancement pawl (46) is mounted on an advancement carriage (48), and in that the advancement carriage (48) can be moved substantially at right angles to the riveting die (4).
16. The riveting unit as claimed in one or more of claims 10 to 15 or in particular as claimed therein, characterized in that the advancement carriage (48) has a control surface (50), acting against which is a disengagement element (51) for disengaging the advancement carriage (48).

10069833-052002

17. The riveting unit as claimed in one or more of claims 10 to 16 or in particular as claimed therein, characterized in that the control surface (50) runs along the angle bisector between the movement direction (r) of the riveting die (4) and the movement direction (t) of the advancement carriage (48).

18. The riveting unit as claimed in one or more of claims 10 to 17 or in particular as claimed therein, characterized in that the advancement carriage (48) has a handle (54) for the manual disengagement of the advancement carriage (48).

19. A riveting unit (1) with a holding-down means (3), a riveting die (4) and a rivet anvil (10), characterized in that the rivet anvil (10) has two joining wings (62) which can be moved in opposite directions to one another and engage over the rivet anvil (10), in the process leaving between them a spacing (a) corresponding to the diameter of the riveting die (4).

20. The riveting unit as claimed in claim 19 or in particular as claimed therein, characterized in that the joining wings (62) are mounted on the rivet anvil (10) about pins (63) transverse to the movement direction (r) of the riveting die (4).

21. The riveting unit as claimed in one or more of claims 19 to 20 or in particular as claimed therein, characterized in that, during the downward movement of the riveting die (4), the joining wings (62) are displaced by means of the material of the elements (55) which are to be connected being displaced laterally by the riveting die (4), the spacing (a) between said joining wings being increased in the process.

22. The riveting unit as claimed in one or more of claims 19 to 21 or in particular as claimed therein,

10069838.052002

characterized in that, during the displacement, the joining wings (62) dig into the material of the elements (55) which are to be connected in part counter to the movement of the riveting die (4).

5

23. A method of riveting two sheet-like elements (55) by means of a riveting device, in particular by means of a riveting unit (1) as claimed in one or more of claims 1 to 22, which has a holding-down means (3) and a riveting die (4), first of all the holding-down means (3) being moved into abutment against the elements (55) and then the riveting die (4) pressing a rivet into the elements (55), connecting the latter in the process, or joining the elements directly to one another, characterized in that the holding-down force (H) is increased in dependence on the die force (N), but to a lesser extent.

10

15

20

24. The method as claimed in claim 23 or in particular as claimed therein, characterized in that the holding-down force (H) is increased starting from a level which first of all exceeds the riveting-die force (N).

25

30

25. A method of joining two sheet-like elements (55) by means of a riveting device, in particular by means of a riveting unit (1) as claimed in one or more of claims 19 to 22, the elements (55) being joined, without using a rivet, merely by deformation by means of the riveting die (4), and a rivet anvil (10) which acts as an abutment, furthermore, being provided, characterized in that the rivet anvil (10) is moved in the opposite direction at least in part as the riveting die (4) is pressed down.

35

26. The method as claimed in claim 25 or in particular as claimed therein, characterized in that the elements (55), in the joining region, are pressed into a radially openable rivet-anvil opening (64).